

REMARKS

Applicants acknowledge receipt of Examiner's Final Office Action dated January 4, 2006. Applicants acknowledge, with thanks, the withdrawal of the prior rejection of claims 1-5, 7-11, 13, and 15 under 35 U.S.C. § 102(e) as being anticipated by Holt et al. (U.S. Publication No. 2003/0145270). All claims, however, remain rejected under 35 U.S.C. § 102(e) as being anticipated by Talagala et al. (U.S. Publication No. 2003/0167439). In light of the foregoing amendments and following remarks, Applicants respectfully request the Examiner's reconsideration and reexamination of all pending claims, including newly added claims 16-21.

Applicants have amended independent claims 1 and 7 by incorporating the limitations of dependent claims 4 and 10, respectively. Applicants have amended claims 5 and 11 by incorporating their base, previously presented independent claims 1 and 7. Dependent claims 16 are new. New dependent claims 16-17 mirror previously presented dependent claims 2-4, respectively. New dependent claims 19-21 mirror previously presented dependent claims 8-10, respectively. Applicants assert that the amendments and new claims set forth above do not add new matter nor necessitate a new search. As such, Applicants request entry of the amendments set forth above.

All claims stand rejected as being anticipated by Talagala. However, the Office Action inconsistently equates elements of the previously presented dependent claims with elements of Talagala, as will be more fully described below.

Amended independent claim 1 now recites:

(Currently Amended) In a RAID data storage system comprising a stripe, wherein the stripe comprises stripe units $B_1 - B_{\max}$, a method comprising:

- receiving a request to read data from stripe unit B_x , wherein B_x is one of stripe units $B_1 - B_{\max}$, wherein the request is received from a computer system in data communication with the RAID data storage system;
- reading stripe parity P corresponding to stripe units $B_1 - B_{\max}$ in response to receiving the request;
- generating new stripe parity P_{new} corresponding to stripe units $B_1 - B_{\max}$ as a function of data of each of the stripe units $B_1 - B_{\max}$;
- comparing the new stripe parity P_{new} with the stripe parity P ;
- returning stripe unit B_x data to the computer system if the stripe parity P compares equally to the new stripe parity P_{new} .

As noted above, currently amended independent claim 1 now includes the limitations of previously presented dependent claim 4. The Office Action asserts that many of the limitations of currently amended claim 1 are found in paragraph 0037 of Talagala. In doing so, the office action equates claim 1's "stripe parity P " with paragraph 0037's stripe checksums. Checksums of Talagala are referred to as **vertical** relationship parity in the Office Action. Thus, the Office Action equates claim 1's stripe parity P with Talagala's vertical relationship parity. For the purposes of this Office Action response only, Applicants will presume that paragraph 0037 teaches reading existing vertical relationship parity, generating new vertical relationship parity, and comparing the vertical relationship parity with the new vertical relationship parity. Applicants will also presume for the purposes of this Office Action response only that currently amended claim 1's acts of reading parity P , generating new parity P_{new} , and comparing parity P with the new

parity P_{new} , reads on the acts of reading existing vertical relationship parity, generating new vertical relationship parity, and comparing the existing vertical relationship parity with the new vertical relationship parity. Notwithstanding these presumptions, Applicants assert that currently amended claim 1 is patentably distinct over cited sections of Talagala.

Previously presented claim 4, now incorporated into currently amended claim 1, was rejected as being taught by Talagala. In rejecting previously presented claim 4, the Office Action asserts that paragraph 0048, lines 6-9 of Talagala teaches “returning stripe unit B_x data to the computer system if the stripe parity P compares equally to the new stripe parity P_{new} .” Applicants note that paragraph 0048 contains only lines 1-5.

Paragraph 0048 states that a “stripe parity integrity test is performed to determine whether a data integrity error exists in the horizontal redundancy relationship, and that if there is no error in the stripe parity, it is concluded that the stripe unit contains valid data and its checksum is restored. Paragraph 0048 teaches the act of testing stripe parity or horizontal relationship parity to determine whether a data integrity error exists.

Applicants will presume for the purpose of this office action only that paragraph 0048 teaches the act of returning data when new horizontal relationship parity compares equally with existing horizontal relationship parity. However, even if paragraph 0048 teaches returning stripe data if the new horizontal relationship parity compares equally with existing horizontal relationship parity, currently amended claim 1 is still patentable over the cited sections since paragraph 0048 *fails* to teach the act of returning data if new vertical relationship parity compares equally to existing vertical relationship parity.

The same parity data used to determine whether to return data in claim 1 is the same parity data that was generated as a function of each of the stripe units, but paragraph 0048

uses parity data other than that generated in paragraph 0037 to determine whether data should be returned. If paragraph 0048 indicated that data would be returned if new **vertical** relationship parity compared equally to existing **vertical** relationship parity, Applicants would be more inclined to agree with a conclusion that paragraphs 0037 and 0048 anticipate currently amended claim 1. Since paragraph 0048 describes returning data if new **horizontal** relationship parity compares equally with existing **horizontal** relationship parity, Applicants assert that currently amended claim 1 is patentably distinguishable over paragraphs 0037 and 0048 of Talagala.

Independent claim 5, as amended, now includes the limitations of previously filed independent claim 1. Independent claim 5 sets forth:

(Currently Amended) ~~The method of claim 1~~
~~further comprising:~~ In a RAID data storage
system comprising a stripe, wherein the stripe
comprises stripe units $B_1 - B_{max}$, a method
comprising:
 receiving a request to read data from stripe
unit B_x , wherein B_x is one of stripe units $B_1 -$
 B_{max} , wherein the request is received from a
computer system in data communication with the
RAID data storage system;
 reading stripe parity P corresponding to
stripe units $B_1 - B_{max}$ in response to receiving the
request;
 generating new stripe parity P_{new}
corresponding to stripe units $B_1 - B_{max}$ as a
function of data of each of the stripe units $B_1 -$
 B_{max} ;
 comparing the new stripe parity P_{new} with
the stripe parity P ;
 if stripe parity P does not compare equally
to new stripe parity P_{new} :
 reading checksum CS data from memory,
wherein the checksum CS data corresponds to
stripe units $B_1 - B_{max}$;
 (a) generating new data for stripe unit B_y ,
one of the stripe units $B_1 - B_{max}$ as a function of
checksum CS data and data of stripe units $B_1 -$
 B_{max} other than stripe unit B_y ;
 (b) generating new checksum CS_{new} data
as a function of the new data for stripe unit B_y and
data of stripe units $B_1 - B_{max}$ other than stripe unit
 B_y ;
 (c) comparing new checksum CS_{new} data
with checksum CS data;
 (d) overwriting data of stripe unit B_y with
the new data of stripe unit B_y if new checksum
 CS_{new} data compares equally to checksum CS
data.

As noted, currently amended independent claim 5 now incorporates previously presented independent claim 1. The Office Action asserts that many of the limitations of previously presented claim 1 are found in paragraph 0037 of Talagala. In doing so, the office action equates previously presented claim 1's "stripe parity P" with paragraph 0037's stripe checksums. Checksums of Talagala are referred to as vertical relationship parity in the Office Action. Thus, the Office Action equates claim 1's stripe parity P with Talagala's vertical relationship parity.

In rejecting previously presented claim 5, the Office Action asserts that paragraph 0048 of Talagala teaches claim 5's act of reading checksum CS data from memory if the stripe parity P does not compare equally to new stripe parity P_{new} , wherein the checksum CS data corresponds to stripe units B_1 through B_{max} . The Office Action equates claim 5's checksum CS data with Talagala's horizontal relationship parity. Thus, the Office action equates currently amended claim 5's parity data P and checksum CS data with Talagala's vertical relationship parity and horizontal relationship parity, respectively.

Thereafter, in rejecting claim 5, the Office Action asserts that paragraph 0049 of Talagala teaches generating new data for stripe unit B_y as a function of checksum CS data and data of stripe units B_1 through B_{max} other than stripe unit B_y . Specifically, the Office Action asserts, "Paragraph 0049 shows that the data of the block that is read may be reconstructed using the parity data of the RAID array, a form of the checksum data." In other words, the Office action asserts that paragraph 0049 describes using horizontal relationship parity to generate new data, which confirms that the Office Action equates Talagala's horizontal relationship parity with claim 5's checksum CS data. However, the Office action then asserts that paragraph 0049 of Talagala teaches generating new checksum data CS_{new} as a function of the new data for stripe units B_1 - B_{max} as a function

of the new data for stripe unit B_y and data of stripe units B_1 - B_{\max} other than stripe unit B_y . Specifically, the Office Action states, “See paragraph 0049 lines 4-5 which show that new data B_y is compared to the original checksum, in order to do this it is inherent that the checksum value of the new data B_y is generated.” While it may be inherent in paragraph 0049 that Talagala’s checksum value (i.e., vertical relationship parity) of the new data is generated, paragraph 0049 does not teach or fairly suggest that Talagala’s parity data (i.e., horizontal relationship data) of the new data is generated. Currently amended claim 5 requires generating new stripe parity P_{new} to determine whether P_{new} equates with P . If not, new checksum CS_{new} (not new parity) is generated. Since the Office Action equates Talagala’s **vertical** and **horizontal** relationship parities with currently amended claim 5’s parity P data and checksum CS data, respectively, paragraph 0049 cannot anticipate generating new checksum CS_{new} data unless paragraph 0049 describes generating new vertical relationship parity. Paragraph 0049, however, describes generating new horizontal relationship data. As such, currently amended claim 5 is patentably distinguishable over the cited sections of Talagala.

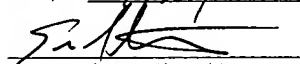
Claims 7 and 11 have been amended along lines similar to those of claims 1 and 5, respectively. As such, Applicants assert that independent claims 7 and 11 are now patentably distinguishable over Talagala for the same or similar reasons that claims 1 and 5 are patentably distinguishable.

The remaining claims depend directly or indirectly from independent claims 1, 5, 7, or 11. Insofar as these claims have been shown to be patentably distinguishable, it follows that the remaining dependent claims are likewise patentably distinguishable.

CONCLUSION

Applicants submit that all claims are now in condition for allowance, and an early notice to that effect is earnestly solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the Examiner is requested to telephone the undersigned.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Mail Stop AF, Commissioner for Patents, P. O. Box 1480, Alexandria, Virginia, 22313-1450, on 1/26/06.


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1/26/06
Date of Signature

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